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# PRELIMINARY INSTRUCTION MANUAL

for

# REGULATED POWER SUPPLIES

## MODEL LA 100-03A

## MODEL LA 100-03AM

This manual applies to units bearing serial number prefixes A & B

LAMBDA ELECTRONICS CORP. HUNTINGTON, N.Y.

## SPECIFICATIONS

DC OUTPUT (regulated for line and load)

Voltage and Current:

| Model | Voltage Range* | Current Range** |
|---|---|---|
| LA 100-03A (no meters) | 0-34 VDC | 0-10A |
| LA 10C-03AM(with meters) | 0-34 VDC | 0-10A |

*Voltage range for each model is completely covered in sixteen continuously variable bands as follows:

Voltage Bands
0-4, 2-6, 4-8, 6-10, 8-12,10-14, 12-16, 14-18, 16-20,18-22, 20-24, 22-26, 24-28, 26-30, 28-32, 30-34

**Current rating applies over entire voltage range.

Regulation (line).....Better than (0.05) per cent or 8 millivolts (whichever is greater). For input variations from 100-130 VAC.

Regulation (load).....Better than (0.10) per cent or 15 millivolts (whichever is greater). For Load Variations from 0 to full load.

Transient Response (line).....Output voltage is constant within regulation specifications for step-function line voltage change from 100-130 VAC or 130-100 VAC.

Transient Response (load).....Output voltage is constant within regulation specifications for step-function load change from 0 to full load or full load to 0 within 50 microseconds after application.

Internal Impendance...Model LA 100-03A, LA 100-03AM less than .004 ohm.

Ripple and Noise.....Less than 1 millivolt rms. with either terminal grounded.

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Page 1.

Polarity.....Either positive or negative may be grounded.

AMBIENT TEMPERATURE AND DUTY CYCLE.....Continuous duty at full load up to 50°C (122°F) ambient.

AC INPUT.....100-130 VAC, 60±0.3 cps*** ****
Models LA 100-03A, LA 100-03AM: 680 watts

***This frequency band amply covers standard commercial power lines in the United States and Canada.

****With output loaded to full rating and input at 130 VAC.

OVERLOAD PROTECTION:

Electrical.....Magnetic circuit breaker, front panel mounted. Unit cannot be injured by short circuit or overload.

Thermal.....Thermostat, manual reset, rear of chassis Thermal overload indicator light, front panel.

INPUT AND OUTPUT CONNECTIONS.....Heavy duty barrier terminal block, rear of chassis.

METERS.....Voltmeter and milliammeter on metered models.

CONTROLS:

DC Output Controls...Band switches and adjustable vernier-control, rear of chassis.

Power.....Magnetic circuit breaker, front panel.

Remote DC Vernier....Provision for remote operation of DC vernier.

Remote Sensing.....Provision is made for remote sensing to minimize effect of power output leads on DC regulation.

PHYSICAL DATA

Mounting.....Standard 19" rack mounting.

Size.....7"H x 19"W x 14-3/8"D

Weight.....93 lbs. net, 120 lbs. shipping wt.

Panel Finish.....Black ripple enamel (standard). Special finishes available to customers' specifications at moderate surcharge.

Polarity.....Either positive or negative may be grounded.

AMBIENT TEMPERATURE
AND DUTY CYCLE.....Continuous duty at full load up to 50°C (122°F) ambient.

AC INPUT.....100-130 VAC, 60Hz, 3 ops***

***This frequency band amply covers standard commercial power lines in the United States and Canada.

****With output loaded to full rating and input at 130 VAC.

OVERLOAD PROTECTION:

Electrical.....Magnetic circuit breaker, front panel mounted. Unit cannot be injured by short circuit or overload.

Thermal.....Thermostat,manual reset,rear of chassis. Thermal overload indicator light/front panel.

INPUT AND OUTPUT
CONNECTIONS.....Heavy duty barrier terminal block, rear of chassis.

METERS.....Voltmeter and milliammeter on metered models.

CONTROLS:

DC Output Control...Hand switches and variable vernier-control, rear of chassis.

Power.....Magnetic circuit breaker, front panel.

Remote DC Vernier...Provision for remote operation of DC vernier.

Remote Sensing.....Provision is made for remote sensing to minimize effect of power output loads on DC regulation.

PHYSICAL DATA

Mounting.....Standard 19" rack mounting.

Size.....7"H x 19"W x 14-1/8"D

Weight.....92 lbs. net, 120 lbs. shipping wt.

Panel Finish.....Black ripple enamel (standard). Special finishes available to customer specifications at moderate surcharge.

## OPERATING INSTRUCTIONS

### CONTROLS, TERMINALS AND FUSES

POWER ON-

The circuit breaker located on the front panel controls input to the supply. Overload of the supply will cause the breaker to trip. When the breaker is turned on the "POWER ON" indicator lamp will glow.

OUTPUT VOLTAGE CONTROLS -

a. Range Switches -

The range switches select the DC voltage operating band. Switch positions are identified by S1, S2, S3 and S4 respectively. The DC output voltage (VDC) is the summation of (S1 + S2 + S3 + S4 + Vernier). The following table lists the operating voltage band and corresponding range switch positions.

| RANGE VDC | SWITCH POSITIONS S1 | S2 | S3 | S4 |
|---|---|---|---|---|
| 0- 4 | 0 | 0 | 0 | 0 |
| 2- 6 | 2v | 0 | 0 | 0 |
| 4- 8 | 0 | 4v | 0 | 0 |
| 6-10 | 2v | 4v | 0 | 0 |
| 8-12 | 0 | 0 | 8v | 0 |
| 10-14 | 2v | 0 | 8v | 0 |
| 12-16 | 0 | 4v | 8v | 0 |
| 14-18 | 2v | 4v | 8v | 0 |
| 16-20 | 0 | 0 | 0 | 16v |
| 18-22 | 2v | 0 | 0 | 16v |
| 20-24 | 0 | 4v | 0 | 16v |
| 22-26 | 2v | 4v | 0 | 16v |
| 24-28 | 0 | 0 | 8v | 16v |
| 26-30 | 2v | 0 | 8v | 16v |
| 28-32 | 0 | 4v | 8v | 16v |
| 30-34 | 2v | 4v | 8v | 16v |

The switches are set to their required positions as given in the table for the particular operating voltage.

b. DC Vernier Control -

This potentiometer varies the DC voltage over a range of 4 volts in each of the voltage bands. Clockwise rotation results in increasing voltage.

THERMOSTAT AND THERMAL OVERLOAD INDICATOR -

The thermostat, manual reset type, is located on the transistor deck, in the rear. The thermostat opens when the temperature of the supply exceeds a maximum safe value. Input power is removed when the thermostat opens. The power supply must then cool down for operation to be restored. Opening of the thermostat causes the "THERMAL OVERLOAD" indicator on the front panel to glow. The "POWER ON" light will extinguish. Operation is restored after proper temperature is reached and the manual reset (red button on rear deck) is pressed.

| RANGE VDC | SWITCH POSITIONS S1 | S2 | S3 | S4 |
|---|---|---|---|---|
| 0- 1 | 0 | 0 | 0 | 0 |
| 2- 6 | 2v | 0 | 0 | 0 |
| 4- 8 | 0 | 2v | 0 | 0 |
| 6-10 | 2v | 2v | 0 | 0 |
| 8-12 | 0 | 0 | 0v | 0 |
| 10-14 | 2v | 0 | 0v | 0 |
| 12-16 | 0 | 2v | 0v | 0 |
| 14-18 | 2v | 2v | 0v | 0 |
| 16-20 | 0 | 0 | 0 | 1ov |
| 18-22 | 2v | 0 | 0 | 1ov |
| 20-24 | 0 | 2v | 0 | 1ov |
| 22-26 | 2v | 2v | 0 | 1ov |
| 24-28 | 0 | 0 | 0v | 1ov |
| 26-30 | 2v | 0 | 0v | 1ov |
| 28-32 | 0 | 2v | 0v | 1ov |
| 30-34 | 2v | 2v | 0v | 1ov |

TERMINALS -

All connections to the supply are made at the terminal block on the rear deck. Input power is applied through the line cord or to terminals 1 and 2 if the line cord is removed. The supply positive terminal is brought out to terminals 3 through 5. The supply negative terminal is brought out to terminals 7 and 8. Recommended wiring of the power supply to the load is shown in the diagrams, "Power Supply to Load Wiring Diagrams", Figs. 1 - 7. Selection of the proper wiring is made on the basis of load requirements. Note- Follow instructions in wiring supply to load.

CURRENT OVERLOAD- (See Power On)

The circuit breaker monitors the DC output current of the supply. A load current in excess of rated value or a short circuit will cause the breaker to trip. The breaker may be placed back into operating condition immediately after removal of the overload condition.

VOLTMETER -

A 0-35 VDC meter monitors the voltage at the output terminals on metered units.

AMMETER -

0-10 amp DC meter monitors the load output current on metered units.

FUSES -

The following table lists the fuses used, their rating, function and location. Overload of the supply will result in tripping of the circuit breaker and not fuse failure.

| MODEL NO. | CIRCUIT SYMBOL | RATING "Slo-Blo" | FUNCTION | LOCATION |
|---|---|---|---|---|
| LA 100-03A | F1 | 15A | AC input | Rear deck |
| and | F2 | 20A | DC internal (power circuits) | Rear deck |
| LA 100-03AM | F3 | 1A | DC internal (DC auxiliary circuits) | Rear deck |
| | F4 | 2/10A | DC internal (DC auxiliary circuits) | Rear deck |

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## POWER SUPPLY TO LOAD WIRING

The output impedance, regulation and transient response of each power supply is so small that connecting leads of practical length can measurably effect these parameters at the load. Provisions have been made to overcome or to minimize the effects of these connecting leads.

The effect of the connecting leads and recommended methods of hookup to the power supply are shown in Figures 1-7.

Figure #1 shows the connecting "Cable Voltage Drop Per Ampere" versus Cable Length for the simple "2 Wire Connection".

Figure #2 shows the connecting "Cable Voltage Drop per Ampere" versus Cable Length for the "Improved 2 Wire Connection".

Figure #3 defines the Separation Distance of Load and Power Supply.

Figure #4 illustrates the "2 Wire Connection". This is the simplest hookup and should be suitable for most applications where extremely close load regulation and fast transient response over full rated current excursion are not required.

Figure #5 illustrates the "Improved 2 Wire Connection". The number of terminals provided permit, in a practical way, the use of paralleled heavy gage leads. If the leads are not unduly long, this hookup will yield excellent regulation and transient response.

Figure #6 illustrates the "4 Wire Connection". This hookup provides complete compensation for the connecting cable DC drops. For cable lengths up to approximately 25 feet, it will permit good transient response at the load for load current changes not exceeding the rate of one ampere per millisecond.

Figure #7 illustrates the "4 Wire Connection Using External Capacitor". This hookup provides complete compensation for connecting cable DC drops. The transient response at the remote load will also be optimized so that it is essentially the same as for the "2 Wire Connection" at the output terminals.

The capacitor value to be used for bypassing the load is 10,000 MFD. It should be of very low internal impedance and connected to the load, with as short heavy gage leads as is practicable. Several sections in parallel may be used to make up this capacity. If desired, Lambda Part #CBT-10-001, 10,000 MFD 55 VDC, may be used. Physical dimensions of this capacitor are 5-7/8" high by 2-9/16" diameter over the plastic sleeve.

GROUND CONNECTIONS-

The power supply may be operated under the following conditions:

A. With the negative terminal grounded.

B. With the positive terminal grounded.

Proper connections for operating with either terminal grounded are shown in figures 4 to 7.

C. With neither terminal grounded.

(Note: When operating the power supply with neither terminal grounded, it should be borne in mind that high impedance leakage resistance and capacitance paths exit between the power supply circuitry and chassis ground.)

REMOTE DC VERNIER CONTROL-

The supply may be operated with remote DC Vernier control. Proper connections are shown in figures 4 to 7.

SERIES OPERATIONS-

For operation of two (2) or more power supplies of equal or unequal rating in series, clamping diodes of suitable rating should be used across each of the power supplies to prevent reverse voltage from appearing across any of the individual supplies. This reverse voltage may appear under certain fault conditions with resultant possible damage to the electrolytic output capacitors. It is suggested that the Lambda engineering department be contacted in specific applications for recommended diode rating and other application information.

VOLTAGE RATINGS- Output Terminals to Chassis

A maximum of 200 volts may be inserted between either the +DC and -DC terminal and chassis ground.

OPERATING PROCEDURE-

1. Remove AC power input to the supply before connecting load to the supply.
2. Select the proper power supply to load wiring by referring to Power Supply to Load Wiring Diagrams (Figs 4-7).
3. Wire power supply to load as per instructions of the applicable diagram.
4. Select the operating voltage band. (See Table, Page 3). Throw the selector switches to the required positions. Set "DC Vernier" control to required position as determined from formula Vernier = VDC - S1 - S2 - S3 - S4.
5. Apply AC power to the supply. Throw the breaker to the "ON" position. Power supply is now operating at desired output voltage.

SAFETY NOTICE

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT. OBSERVE THE USUAL SAFETY PRECAUTIONS WHEN OPERATING OR SERVICING THE EQUIPMENT TO AVOID SHOCK OR INJURY.

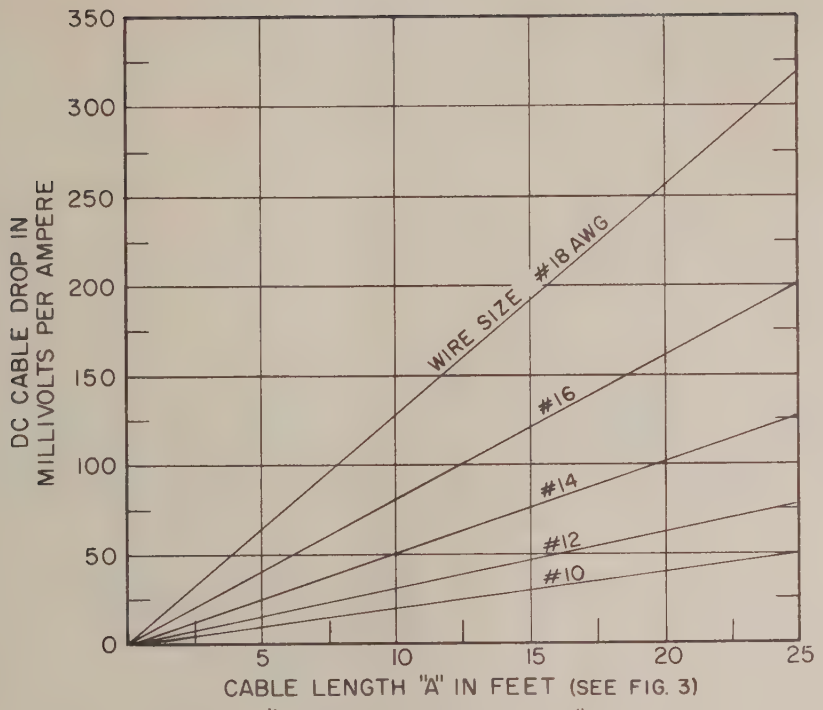



FIG. 1. "2-WIRE CONNECTION" (SEE FIG. 4)

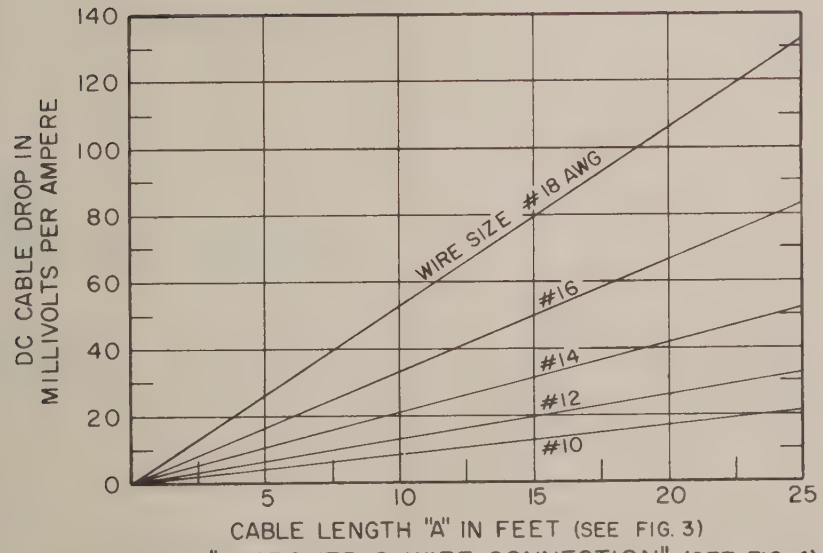



FIG. 2. "IMPROVED 2-WIRE CONNECTION" (SEE FIG. 4)

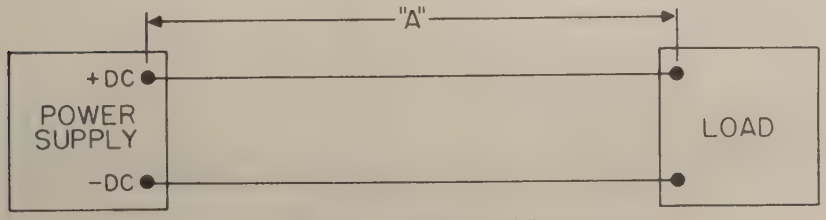



FIG. 3. CABLE LENGTH "A" IN FEET

FIG. 4. "2-WIRE CONNECTION"
(SEE FIG. I FOR SELECTION OF CONNECTING WIRE SIZE)

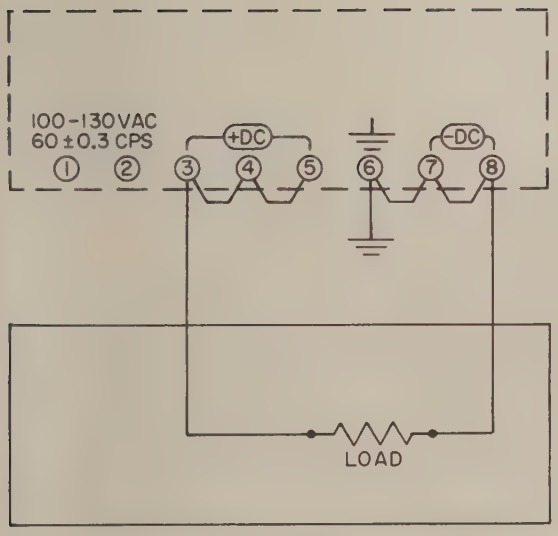



FIG. 4a
NEGATIVE TERMINAL GROUNDED

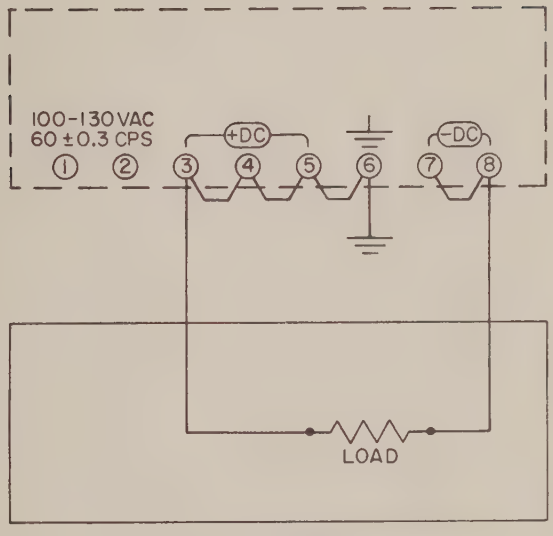



FIG. 4b
POSITIVE TERMINAL GROUNDED

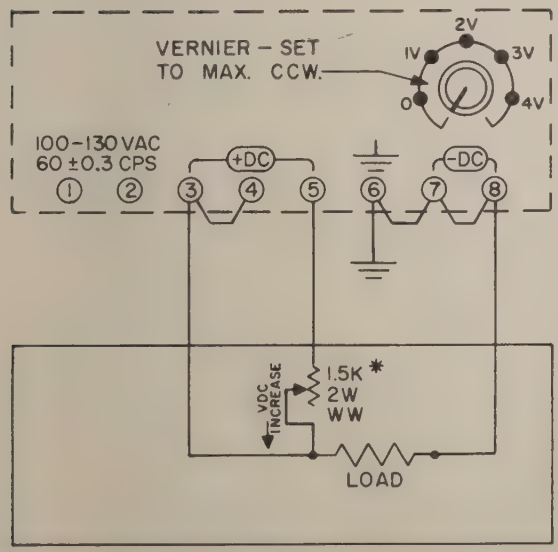



FIG. 4c
*REMOTE DC VERNIER CONTROL
WITH NEGATIVE TERMINAL GROUNDED

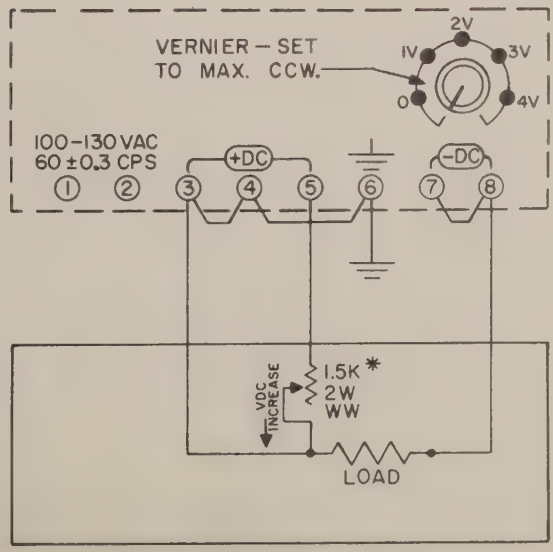



FIG. 4d
*REMOTE DC VERNIER CONTROL
WITH POSITIVE TERMINAL GROUNDED

FIG. 5. "IMPROVED 2-WIRE CONNECTION"
(SEE FIG. 2 FOR SELECTION OF CONNECTING WIRE SIZE)

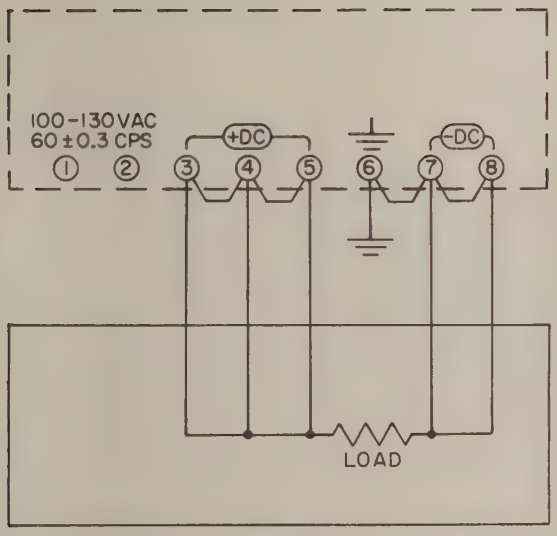



FIG. 5a
NEGATIVE TERMINAL GROUNDED

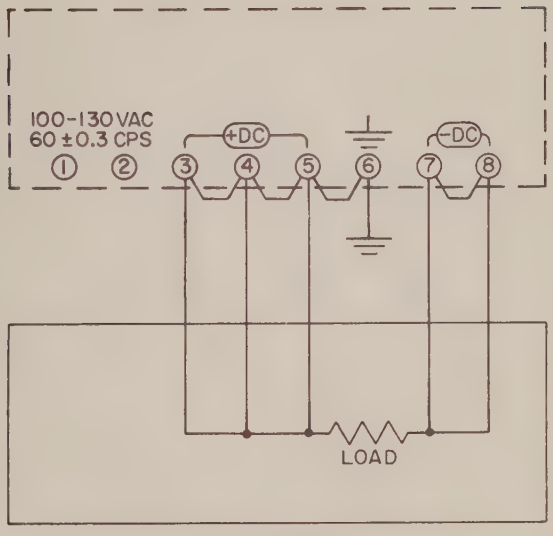



FIG. 5b
POSITIVE TERMINAL GROUNDED

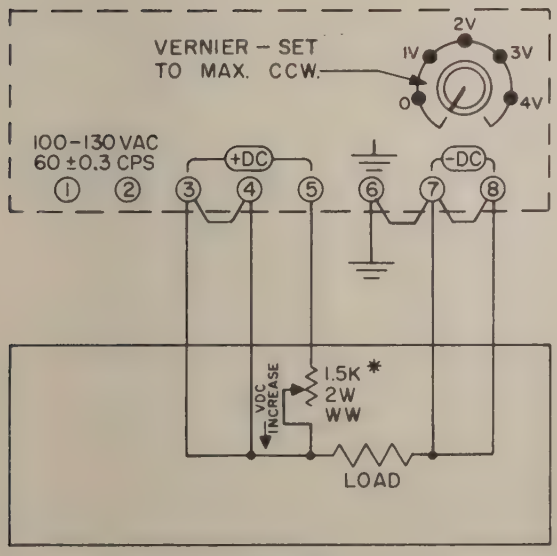



FIG. 5c
*REMOTE DC VERNIER CONTROL
WITH NEGATIVE TERMINAL GROUNDED

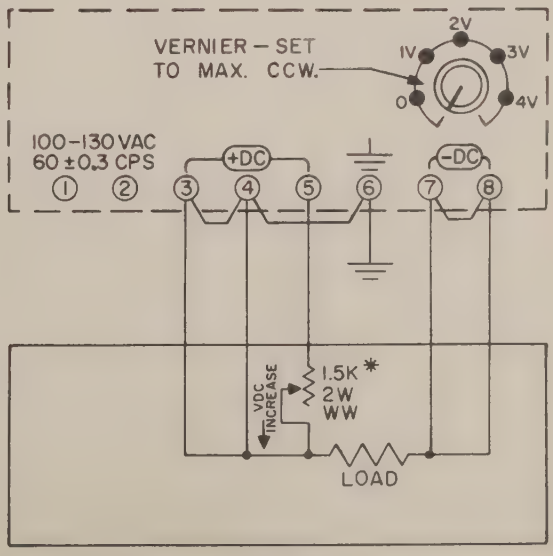



FIG. 5d
*REMOTE DC VERNIER CONTROL
WITH POSITIVE TERMINAL GROUNDED

FIG. 6. "4-WIRE CONNECTION"

(SEE TEXT)

WIRE SIZES SHOWN ARE MINIMUM

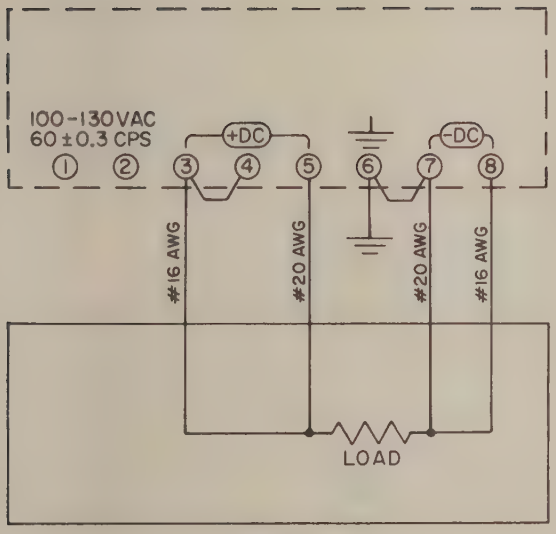



FIG. 6a

NEGATIVE TERMINAL GROUNDED

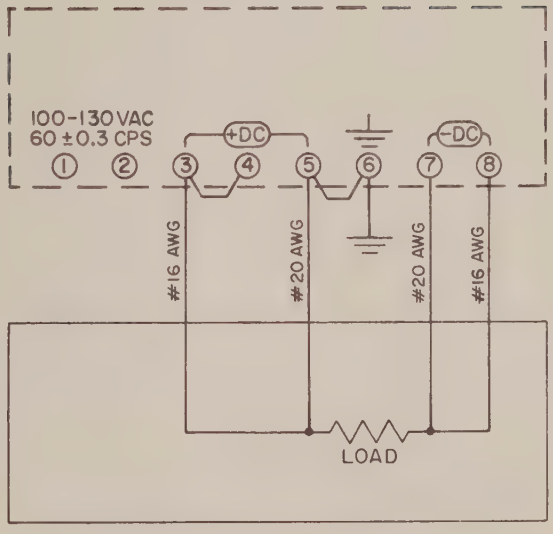



FIG. 6b

POSITIVE TERMINAL GROUNDED

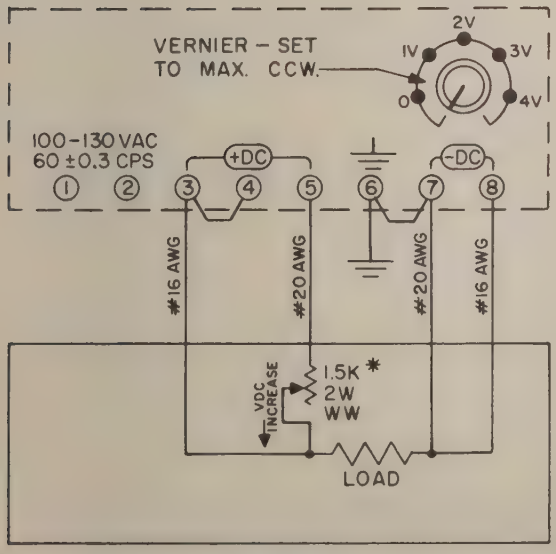



FIG. 6c

*REMOTE DC VERNIER CONTROL
WITH NEGATIVE TERMINAL GROUNDED

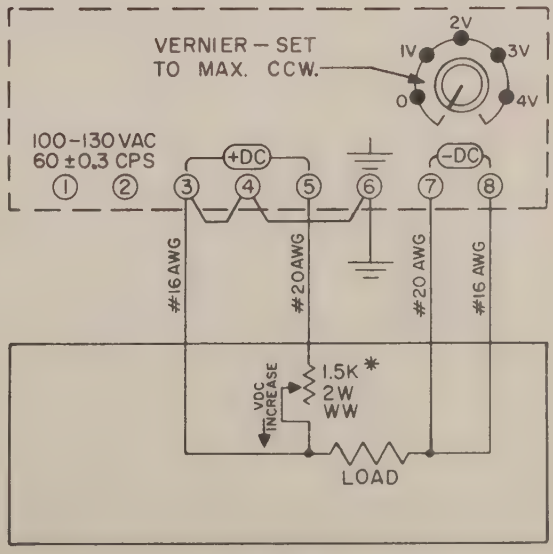



FIG. 6d

*REMOTE DC VERNIER CONTROL
WITH POSITIVE TERMINAL GROUNDED

FIG. 7. "4-WIRE CONNECTION"
USING EXTERNAL CAPACITOR
(SEE TEXT)
WIRE SIZES SHOWN ARE MINIMUM

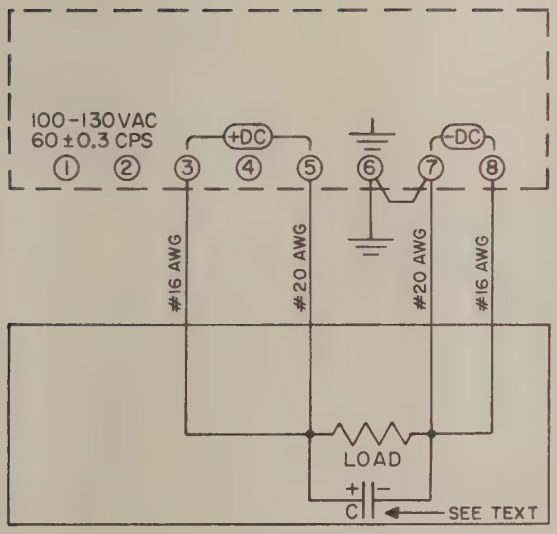



FIG. 7a
NEGATIVE TERMINAL GROUNDED

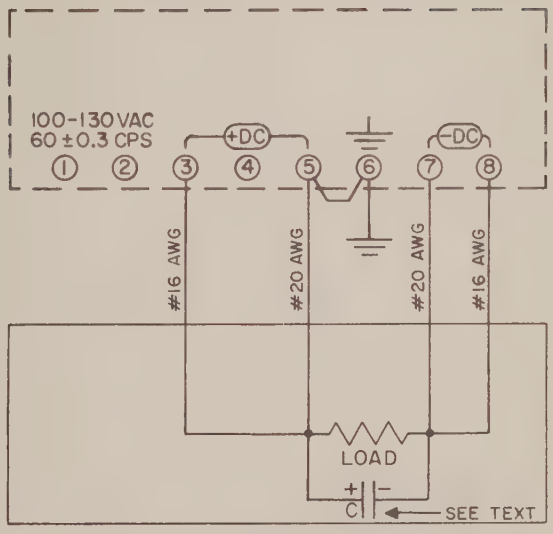



FIG. 7b
POSITIVE TERMINAL GROUNDED

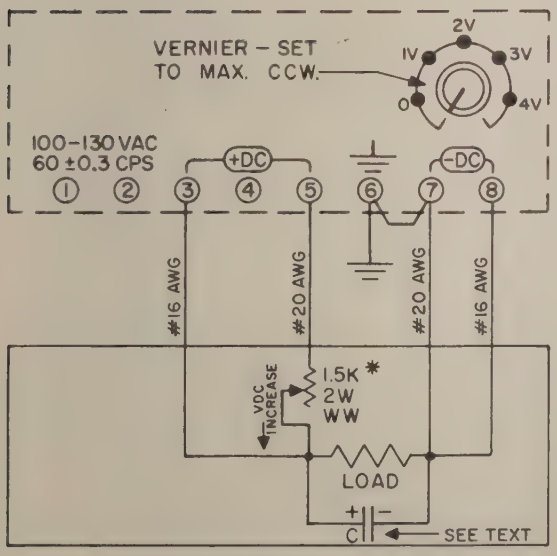



FIG. 7c
*REMOTE DC VERNIER CONTROL
WITH NEGATIVE TERMINAL GROUNDED

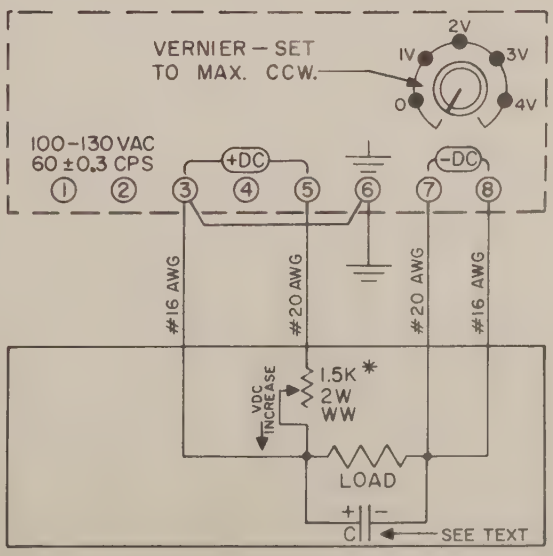
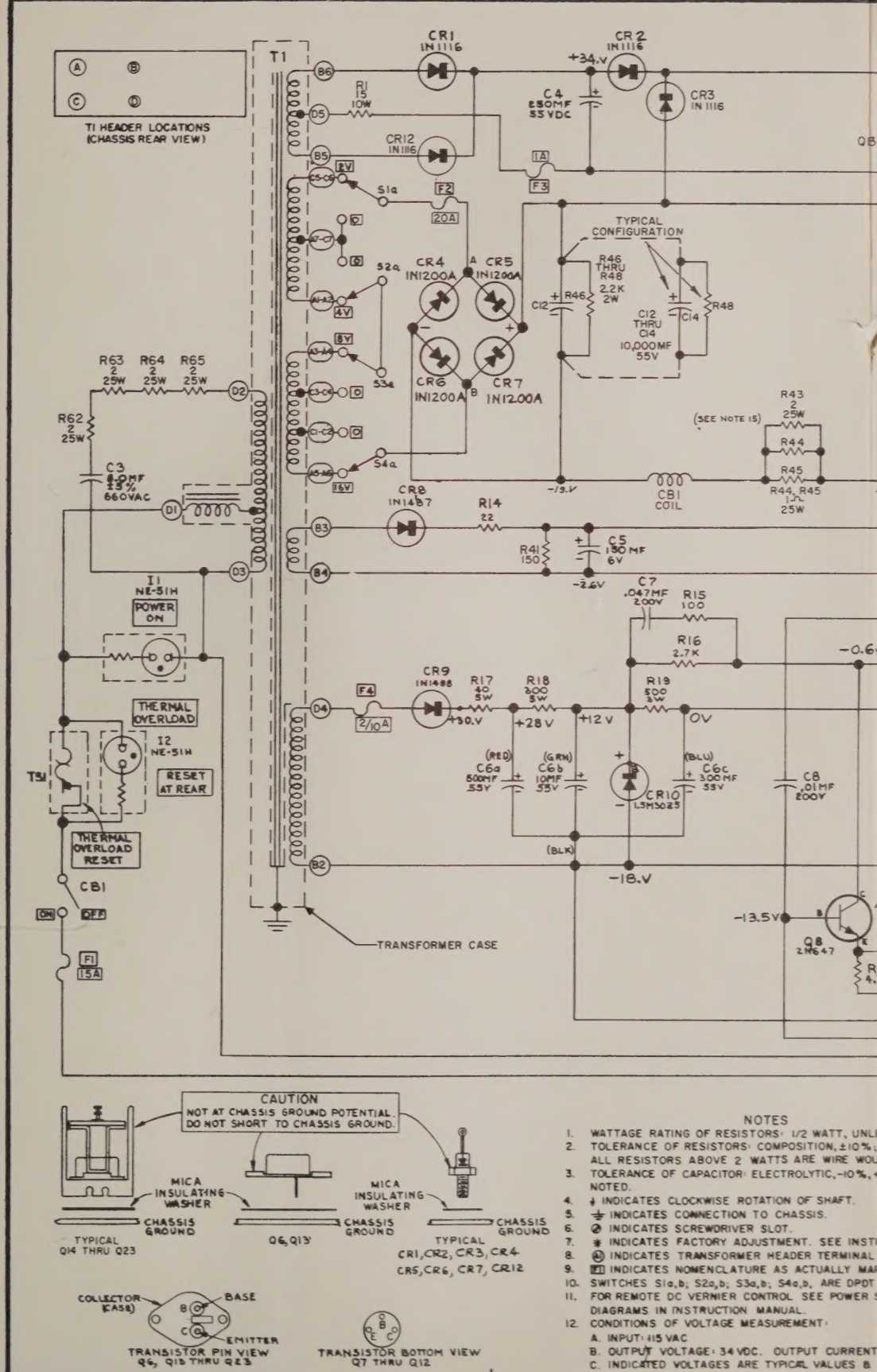
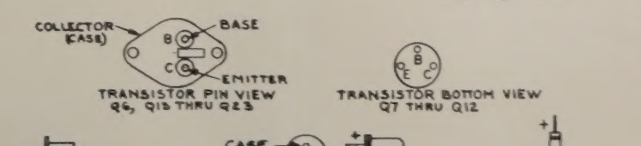
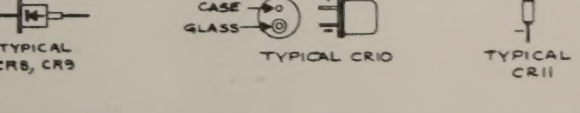



FIG. 7d
*REMOTE DC VERNIER CONTROL
WITH POSITIVE TERMINAL GROUNDED

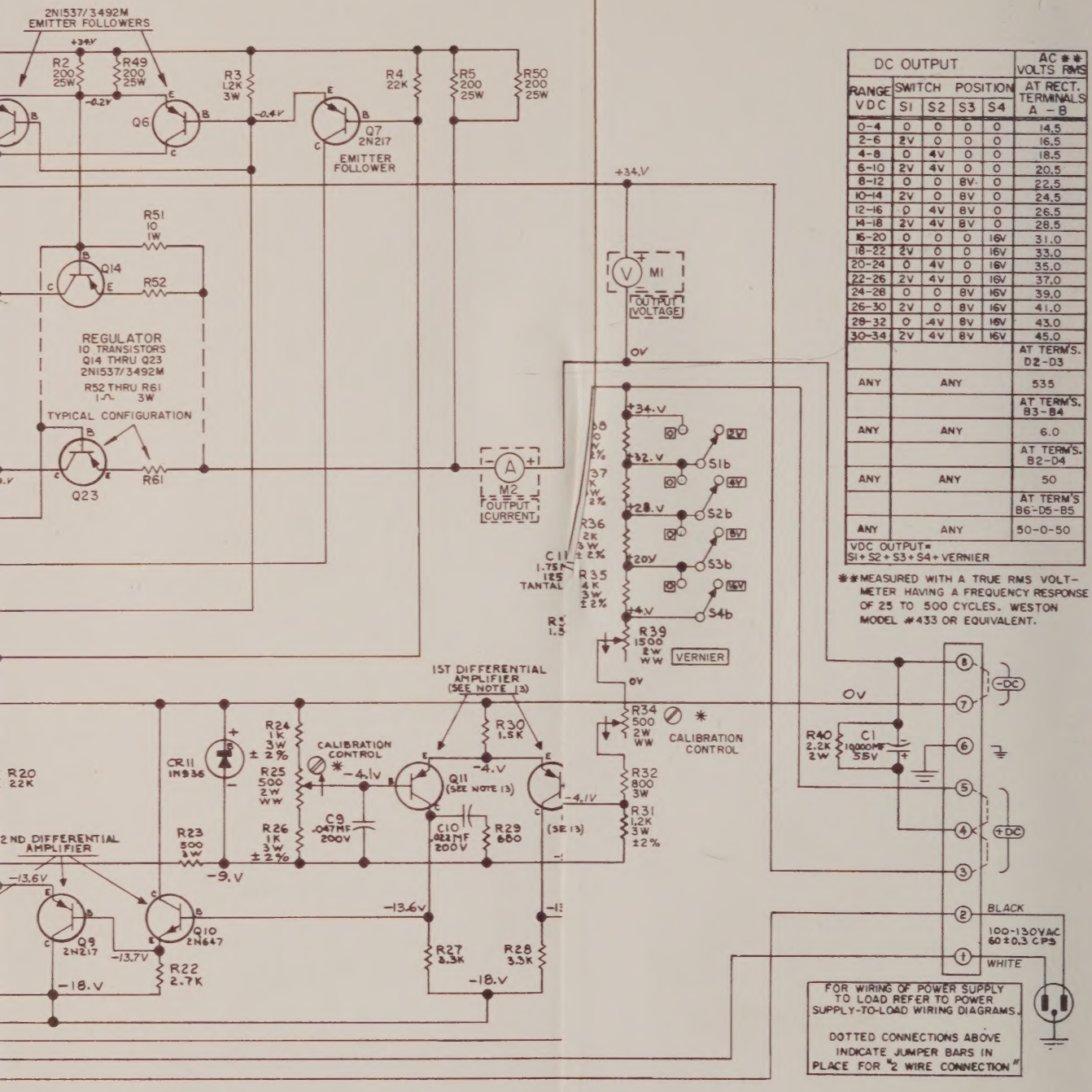



## NOTES

1. WATTAGE RATING OF RESISTORS: 1/2 WATT, UNLE
2. TOLERANCE OF RESISTORS: COMPOSITION, ±10%; ALL RESISTORS ABOVE 2 WATTS ARE WIRE WOU
3. TOLERANCE OF CAPACITOR: ELECTROLYTIC, -10%, + NOTED.
4. ϕ INDICATES CLOCKWISE ROTATION OF SHAFT.
5. ⏚ INDICATES CONNECTION TO CHASSIS.
6. ⊘ INDICATES SCREWDRIVER SLOT.
7. ✱ INDICATES FACTORY ADJUSTMENT. SEE INSTR
8. (B) INDICATES TRANSFORMER HEADER TERMINAL
9. F1 INDICATES NOMENCLATURE AS ACTUALLY MA
10. SWITCHES S1a,b; S2a,b; S3a,b; S4a,b, ARE DPDT
11. FOR REMOTE DC VERNIER CONTROL SEE POWER S DIAGRAMS IN INSTRUCTION MANUAL.
12. CONDITIONS OF VOLTAGE MEASUREMENT:
    A. INPUT: 115 VAC
    B. OUTPUT VOLTAGE: 34 VDC. OUTPUT CURRENT
    C. INDICATED VOLTAGES ARE TYPICAL VALUES &
    D. MEASUREMENTS MADE USING 20,000 OHMS/V (TERM. #7 OR #8) & INDICATED POINTS, UNLES
13. THE INPUT DIFFERENTIAL AMPLIFIER (Q11 & Q12) TRANSISTORS WHICH SHOULD BE REPLACED AS A LAMBDA AS PART # FBN-2N217MP. (COMPRISES M
14. ALL FUSES TYPE 3 AG, "SLO-BLO".
15. R42 & R43 WAS 1-Ω-, 25W ON UNITS BEARING SE R42 OMITTED ON UNITS BEARING SERIAL NUMBE




| DC OUTPUT | | | | | AC ** VOLTS RMS |
|---|---|---|---|---|---|
| RANGE VDC | SWITCH POSITION S1 | S2 | S3 | S4 | AT RECT. TERMINALS A – B |
| 0–4 | 0 | 0 | 0 | 0 | 14.5 |
| 2–6 | 2V | 0 | 0 | 0 | 16.5 |
| 4–8 | 0 | 4V | 0 | 0 | 18.5 |
| 6–10 | 2V | 4V | 0 | 0 | 20.5 |
| 8–12 | 0 | 0 | 8V | 0 | 22.5 |
| 10–14 | 2V | 0 | 8V | 0 | 24.5 |
| 12–16 | 0 | 4V | 8V | 0 | 26.5 |
| 14–18 | 2V | 4V | 8V | 0 | 28.5 |
| 16–20 | 0 | 0 | 0 | 16V | 31.0 |
| 18–22 | 2V | 0 | 0 | 16V | 33.0 |
| 20–24 | 0 | 4V | 0 | 16V | 35.0 |
| 22–26 | 2V | 4V | 0 | 16V | 37.0 |
| 24–28 | 0 | 0 | 8V | 16V | 39.0 |
| 26–30 | 2V | 0 | 8V | 16V | 41.0 |
| 28–32 | 0 | 4V | 8V | 16V | 43.0 |
| 30–34 | 2V | 4V | 8V | 16V | 45.0 |
| | | | | | AT TERM'S. D2–D3 |
| ANY | ANY | | | | 535 |
| | | | | | AT TERM'S. B3–B4 |
| ANY | ANY | | | | 6.0 |
| | | | | | AT TERM'S. B2–D4 |
| ANY | ANY | | | | 50 |
| | | | | | AT TERM'S B6–D5–B5 |
| ANY | ANY | | | | 50–0–50 |
| VDC OUTPUT= S1+S2+S3+S4+VERNIER | | | | | |

**MEASURED WITH A TRUE RMS VOLTMETER HAVING A FREQUENCY RESPONSE OF 25 TO 500 CYCLES. WESTON MODEL #433 OR EQUIVALENT.

S NOTED.
REWOUND, ±5%, UNLESS NOTED.
0%; PAPER, ±10%, UNLESS

CTION MANUAL.
ED ON UNIT.
OGGLE SWITCHES.
PPLY TO LOAD WIRING

ERO, UNLESS OTHERWISE NOTED.
E DC, UNLESS NOTED.
T METER BETWEEN "-DC"
NOTED.
LIZES A PAIR OF MATCHED
AIR, OBTAINABLE FROM
TCHED PAIR).

AL NUMBER PREFIX A.
PREFIX B.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO PREFIXES A & B.

SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY
MODEL LA100-03A, LA100-03AM
METERS INCLUDED IN "M" MODELS ONLY

LAMBDA
ELECTRONICS CORP.
HUNTINGTON, NEW YORK

## WARRANTY

We warrant each instrument manufactured by us, and sold by us or our authorized agents, to be free from defects in material and workmanship; our obligation under this warranty being limited to repairing or replacing any instrument or part thereof, which shall, within five years after delivery to the original purchaser, be returned to us with transportation charges prepaid, prove after our examination to be thus defective.

We reserve the right to discontinue instruments without notice, and to make modifications in design at any time without incurring any obligation to make such modifications to instruments previously sold.

LAMBDA ELECTRONICS CORP. HUNTINGTON, N. Y.

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